Fig. 1A

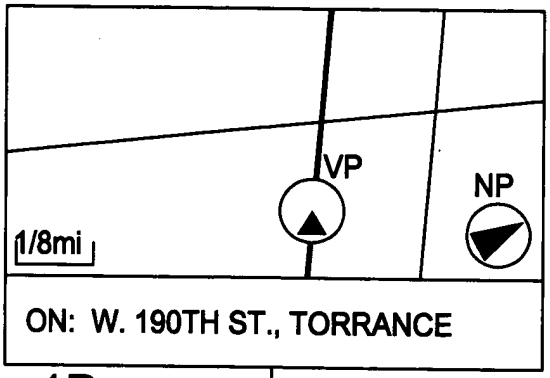

Fig. 1B

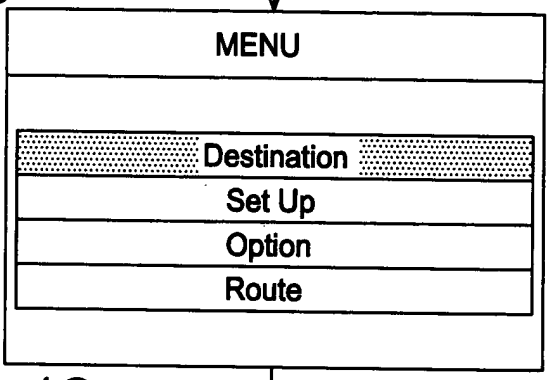

Fig. 1C

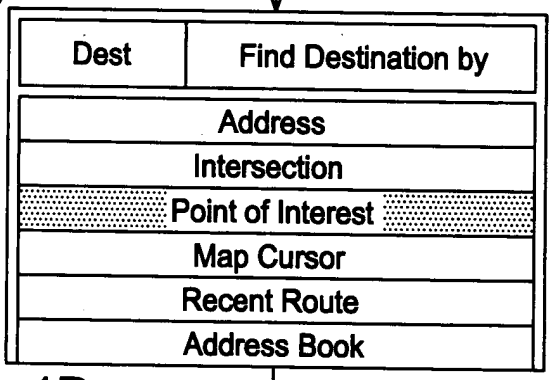

Fig. 1D

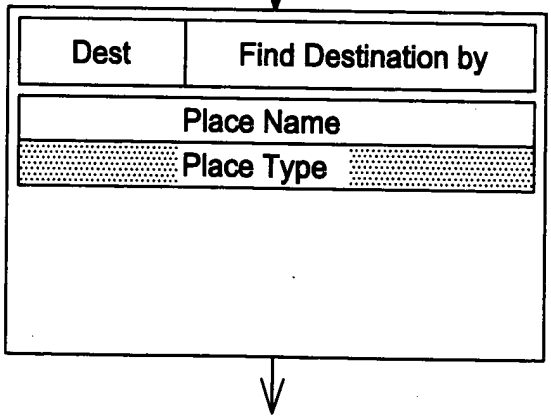

Fig. 1E

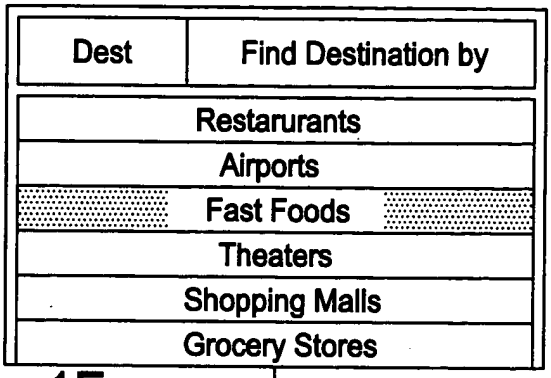

Fig. 1F

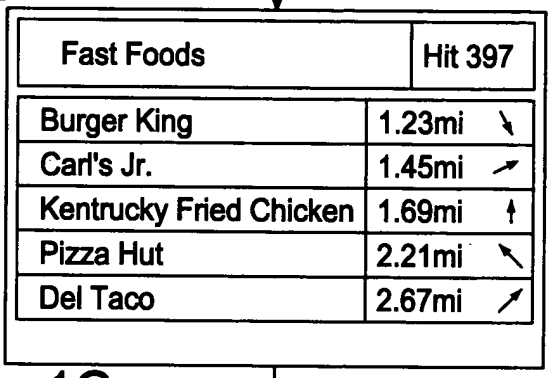

Fig. 1G

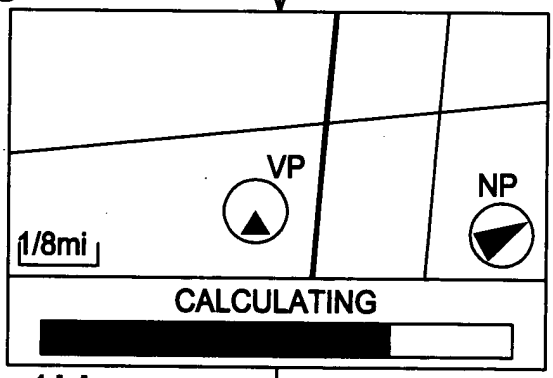

Fig. 1H

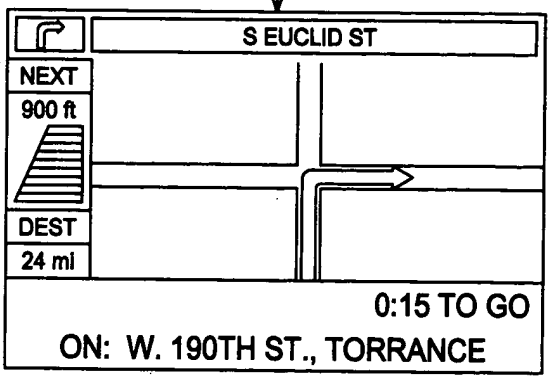

Fig. 2

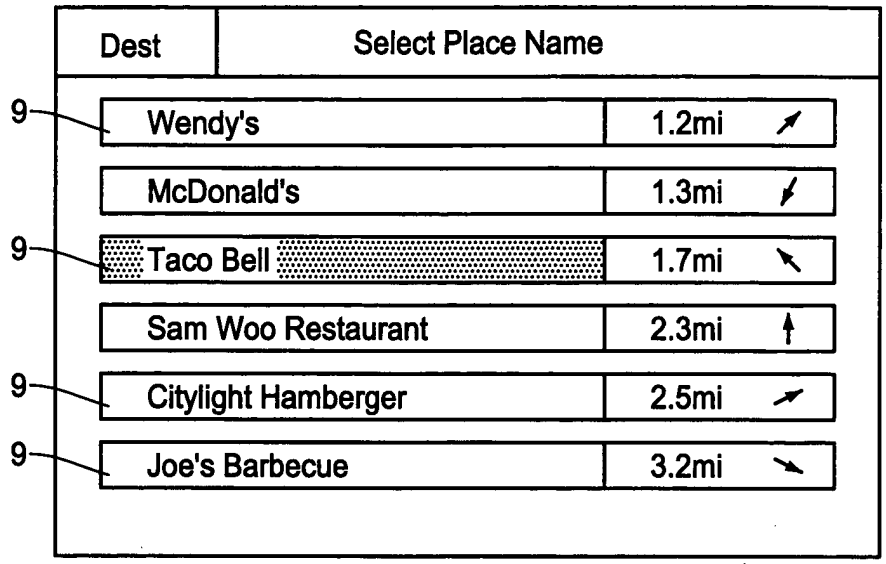
Dest
Select Place Name
9
Wendy's
1.2mi
McDonald's
1.3mi
9
Taco Bell
1.7mi
Sam Woo Restaurant
2.3mi
9
Citylight Hamberger
2.5mi
9
Joe's Barbecue
3.2mi

Fig. 3

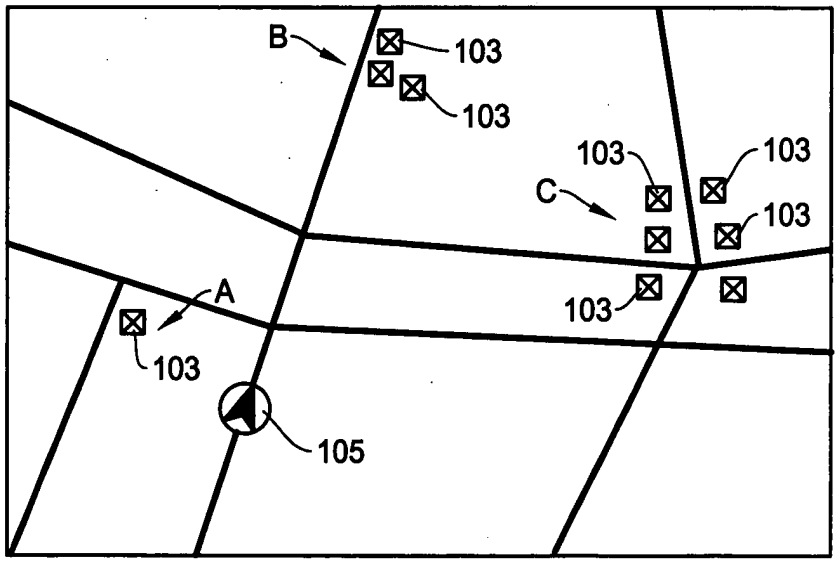
B
103
103
103
103
C
103
103
A
103
103
105

Fig. 4

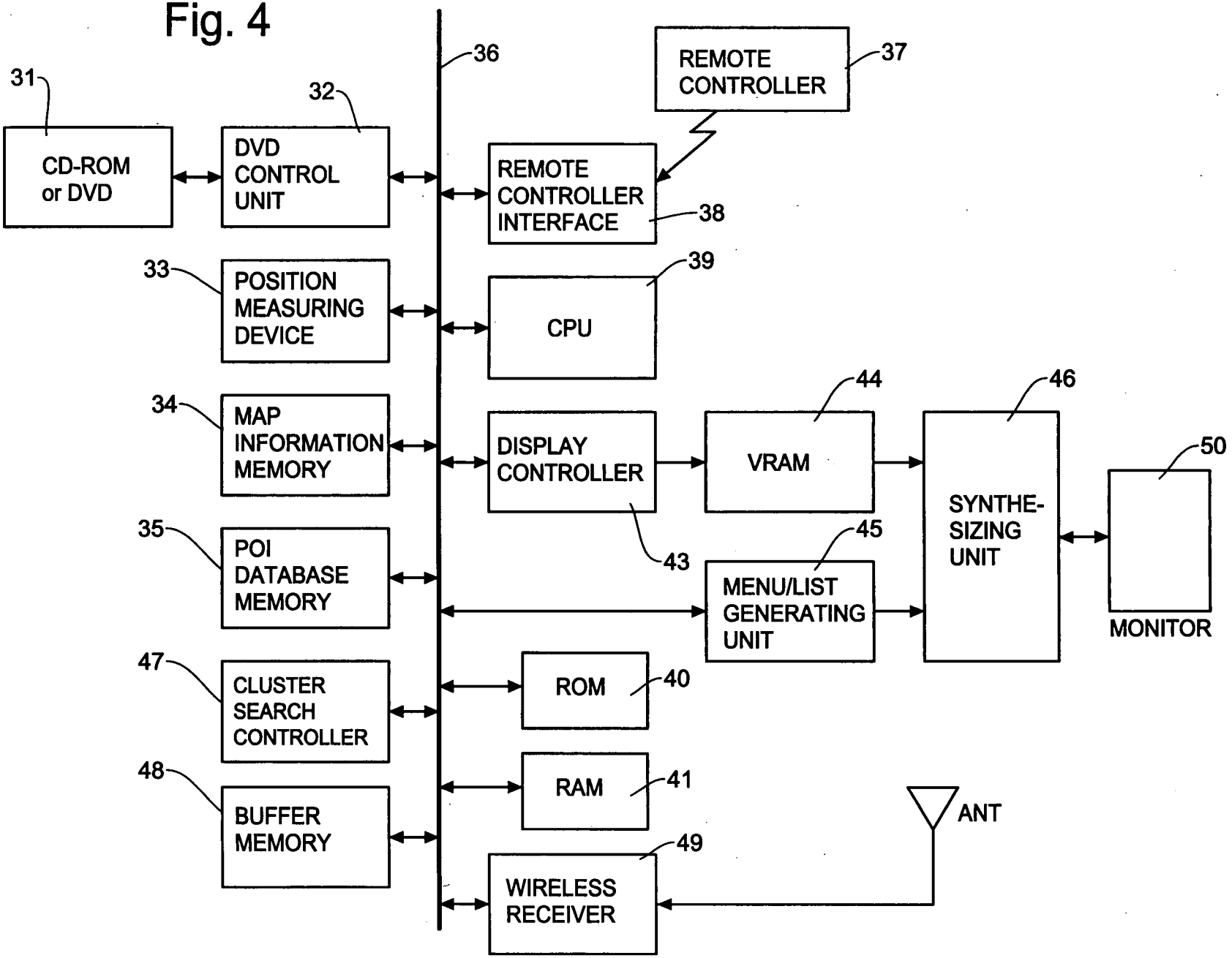
31
CD-ROM or DVD
32
DVD CONTROL UNIT
36
REMOTE CONTROLLER
37
REMOTE CONTROLLER INTERFACE
38
33
POSITION MEASURING DEVICE
39
CPU
34
MAP INFORMATION MEMORY
44
46
DISPLAY CONTROLLER
VRAM
SYNTHE-SIZING UNIT
50
43
45
35
POI DATABASE MEMORY
MENU/LIST GENERATING UNIT
MONITOR
47
CLUSTER SEARCH CONTROLLER
ROM
40
48
BUFFER MEMORY
RAM
41
ANT
49
WIRELESS RECEIVER

Fig. 5

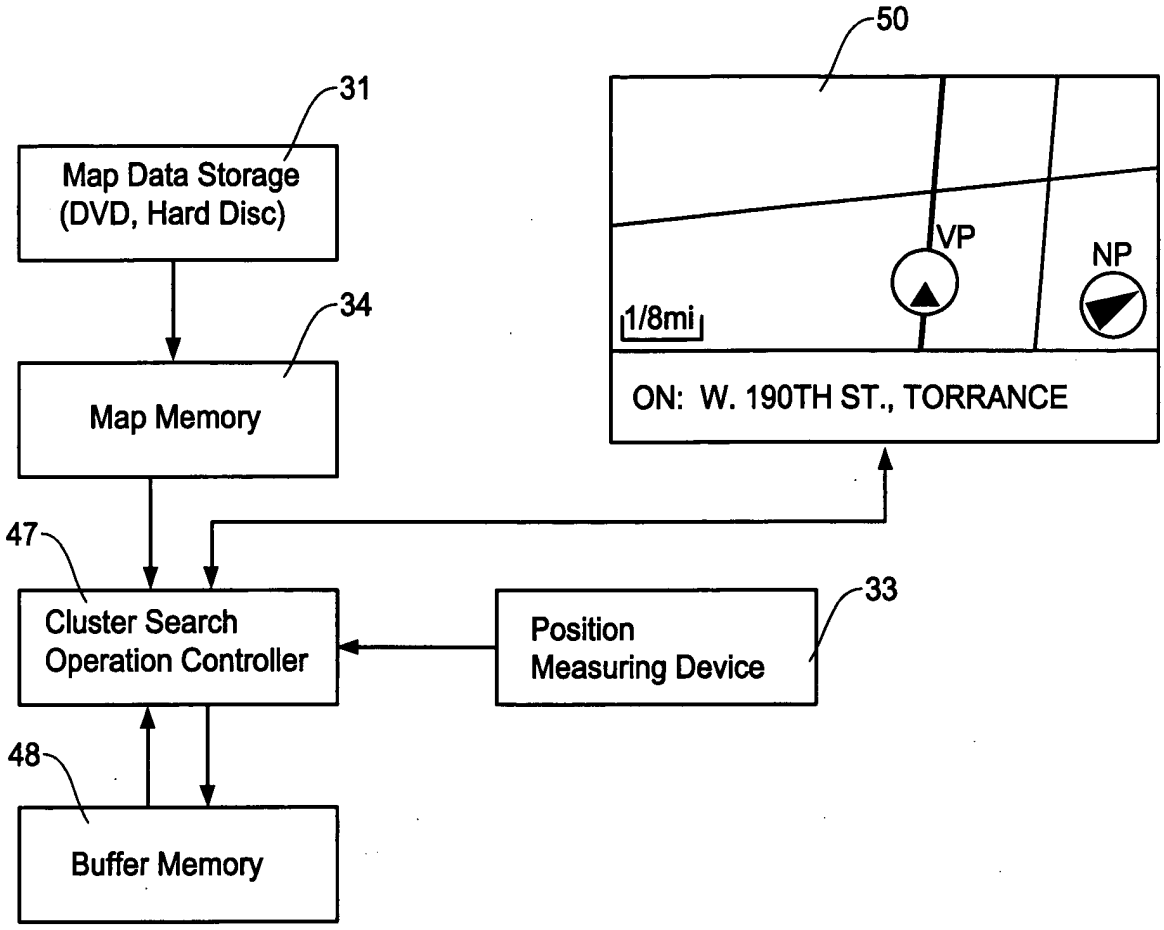
50
31
Map Data Storage
(DVD, Hard Disc)
34
Map Memory
47
Cluster Search
Operation Controller
48
Buffer Memory
Position
Measuring Device
33
VP
NP
1/8mi
ON: W. 190TH ST., TORRANCE

Fig. 6

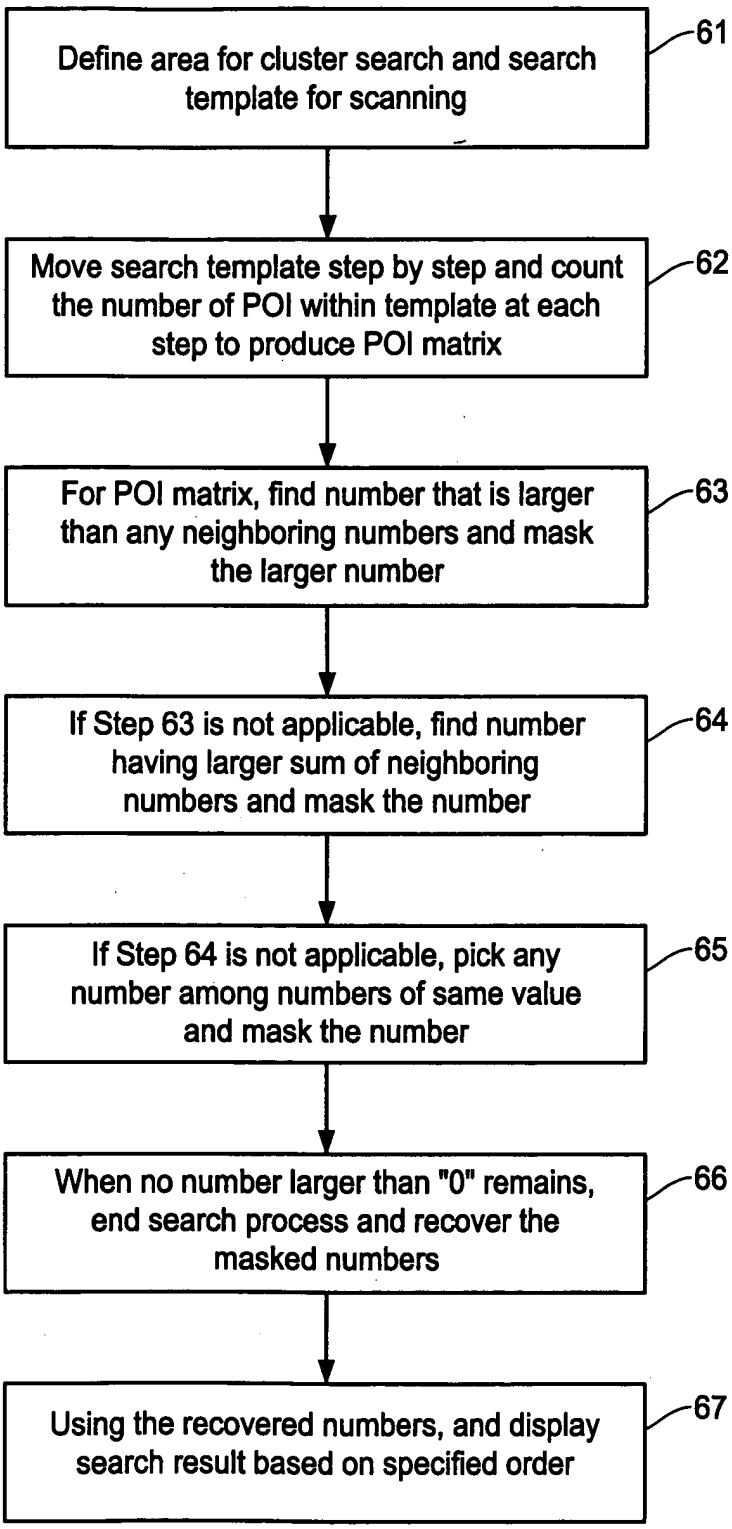
Define area for cluster search and search template for scanning
61
Move search template step by step and count the number of POI within template at each step to produce POI matrix
62
For POI matrix, find number that is larger than any neighboring numbers and mask the larger number
63
If Step 63 is not applicable, find number having larger sum of neighboring numbers and mask the number
64
If Step 64 is not applicable, pick any number among numbers of same value and mask the number
65
When no number larger than "0" remains, end search process and recover the masked numbers
66
Using the recovered numbers, and display search result based on specified order
67

Fig. 7A

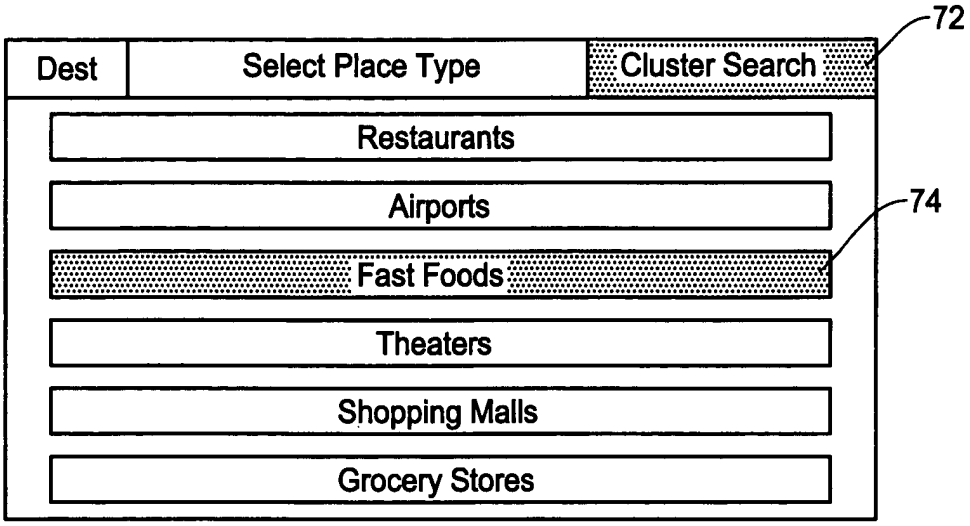
Dest
Select Place Type
Cluster Search
72
Restaurants
Airports
74
Fast Foods
Theaters
Shopping Malls
Grocery Stores

Fig. 7B

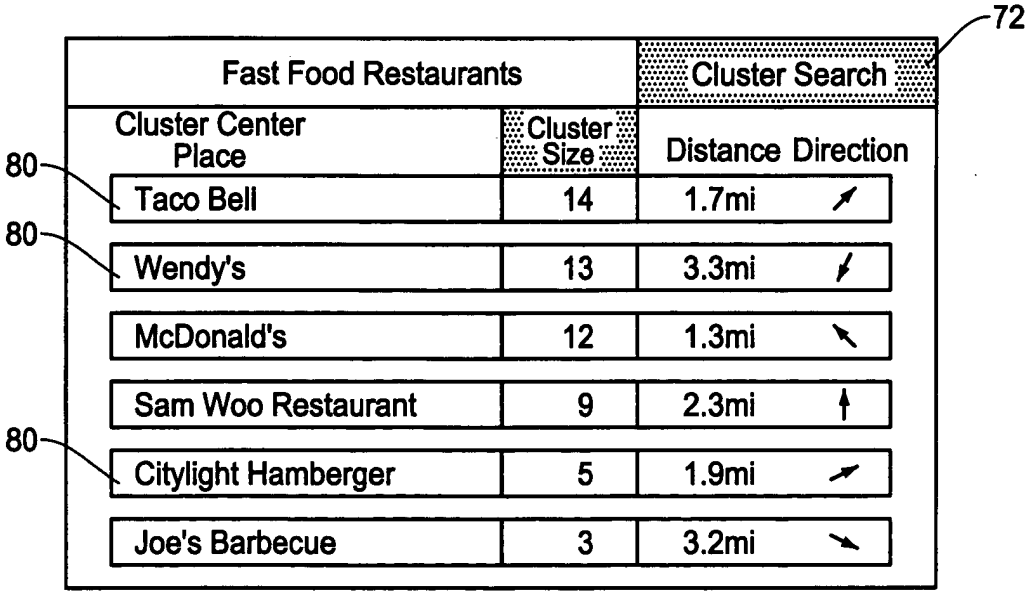
Fast Food Restaurants
Cluster Search
72
Cluster Center Place
Cluster Size
Distance
Direction
80
Taco Bell
14
1.7mi
80
Wendy's
13
3.3mi
McDonald's
12
1.3mi
Sam Woo Restaurant
9
2.3mi
80
Citylight Hamberger
5
1.9mi
Joe's Barbecue
3
3.2mi

Fig. 8A

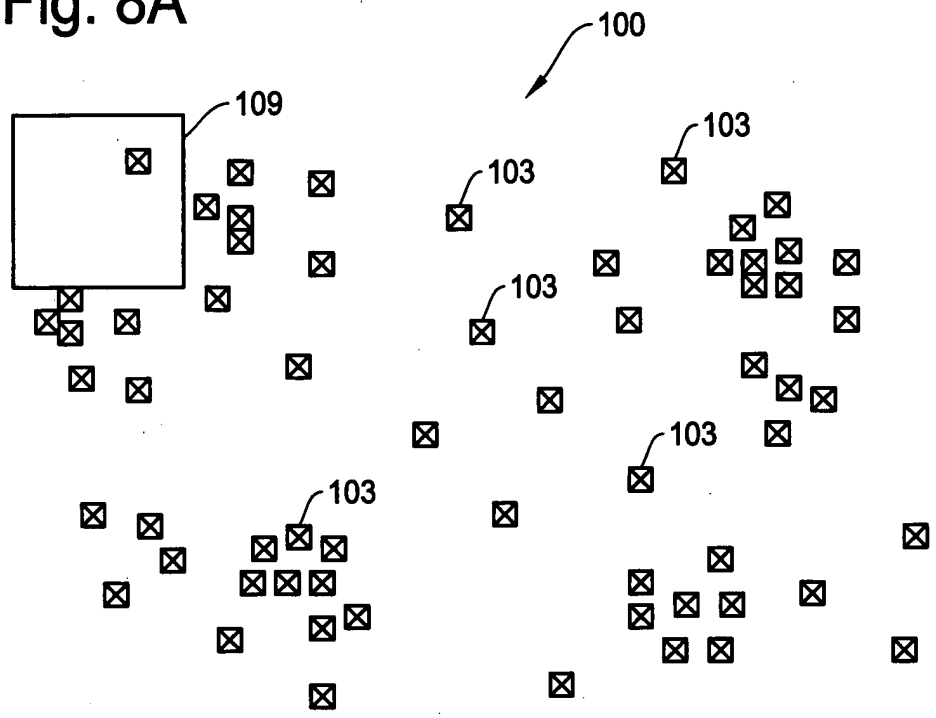

Fig. 8B

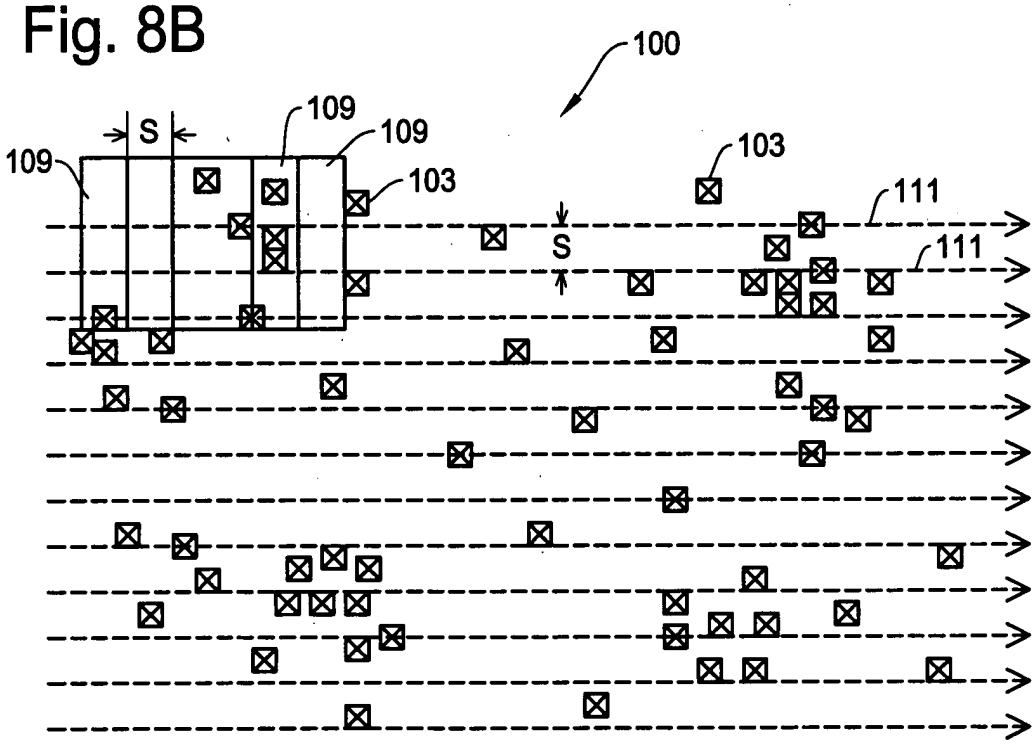

Fig. 9A

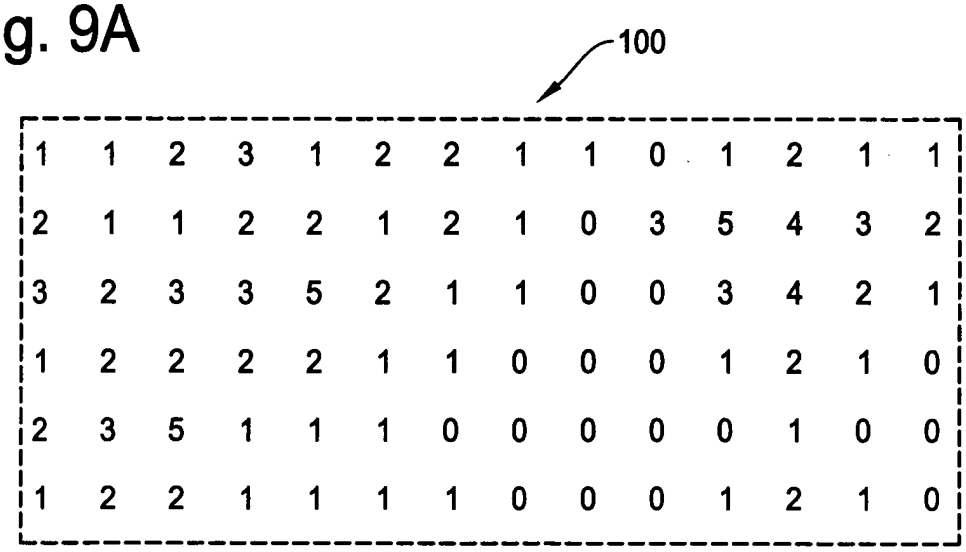

Fig. 9B

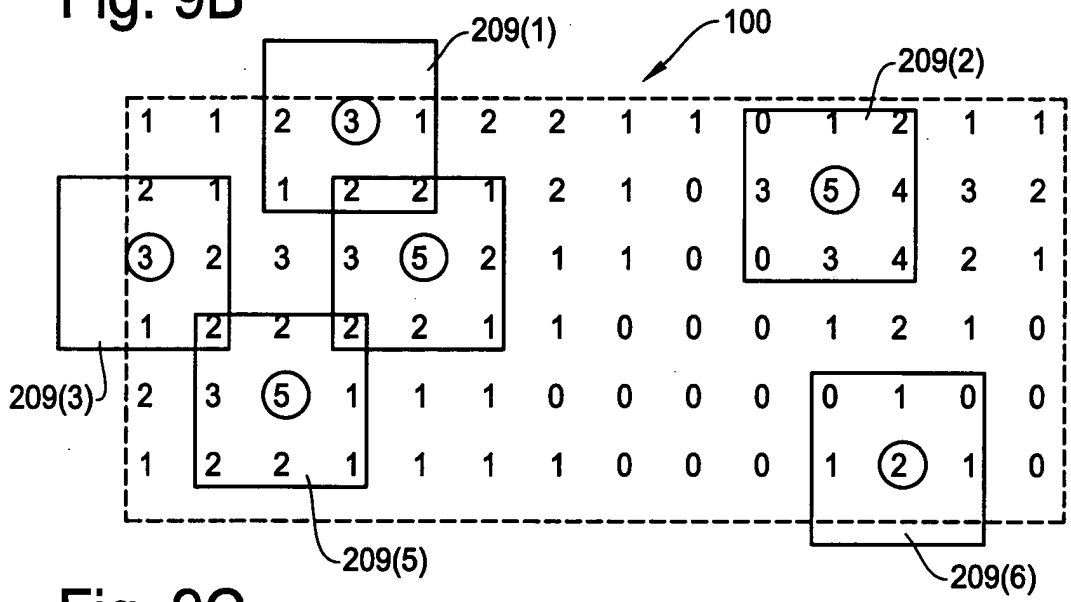

Fig. 9C

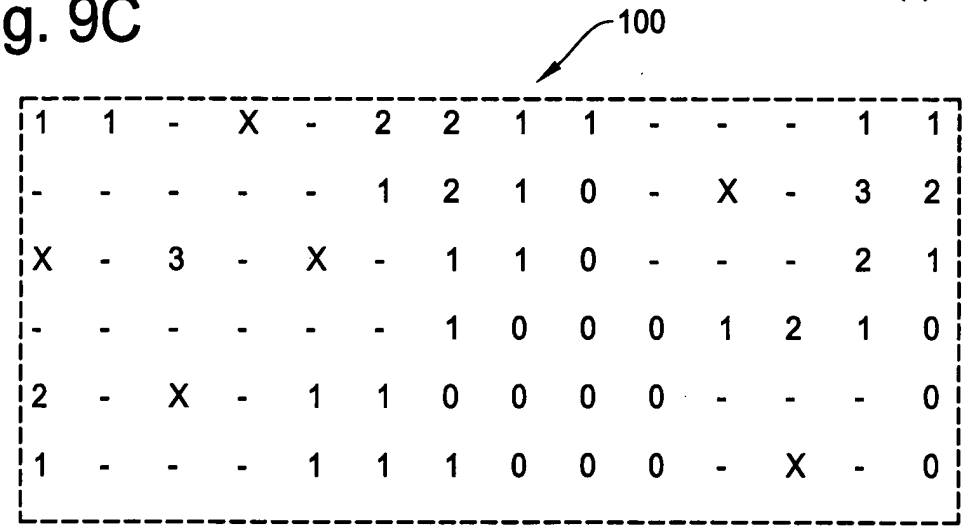

Fig. 9D

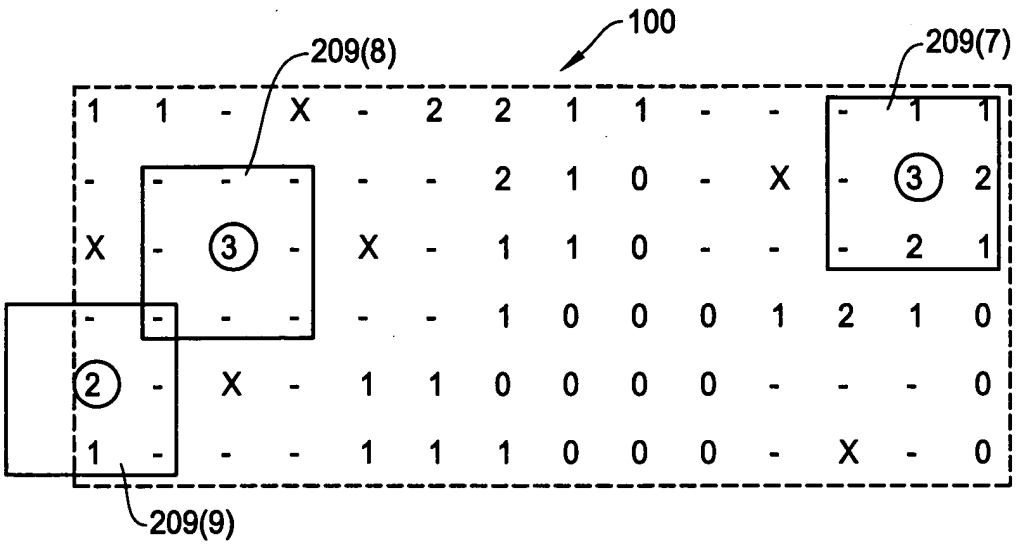
100
209(8)
209(7)
209(9)
1 1 - X - 2 2 1 1 - - - 1 1
- - - - - - 2 1 0 - X - 3 2
X - 3 - X - 1 1 0 - - - 2 1
- - - - - - 1 0 0 0 1 2 1 0
2 - X - 1 1 0 0 0 0 - - - 0
1 - - - 1 1 1 0 0 0 - X - 0

Fig. 9E

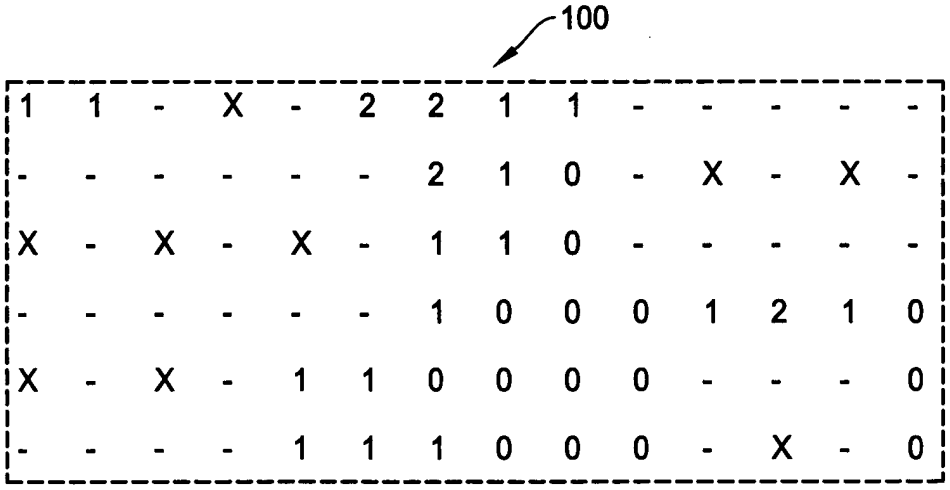
100
1 1 - X - 2 2 1 1 - - - - -
- - - - - - 2 1 0 - X - X -
X - X - X - 1 1 0 - - - - -
- - - - - - 1 0 0 0 1 2 1 0
X - X - 1 1 0 0 0 0 - - - 0
- - - - 1 1 1 0 0 0 - X - 0

Fig. 9F

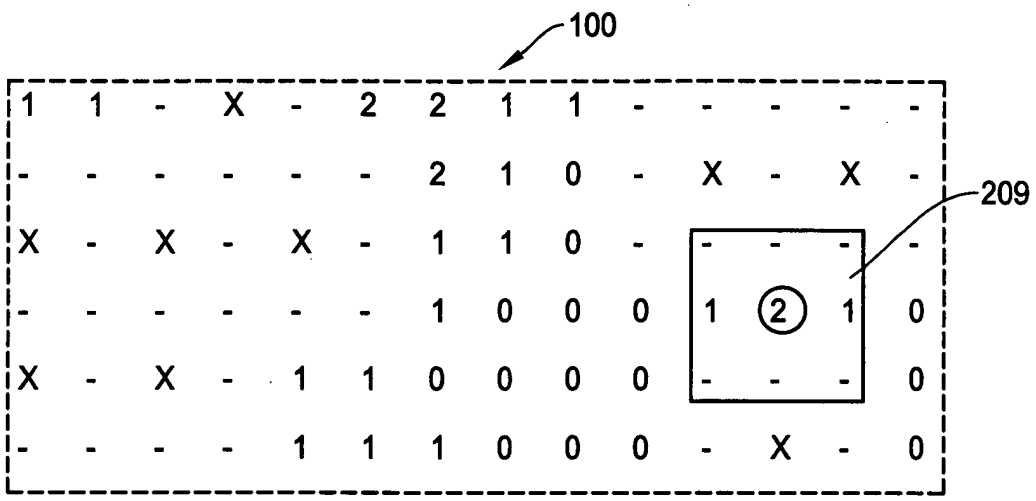
100
209
1 1 - X - 2 2 1 1 - - - - -
- - - - - - 2 1 0 - X - X -
X - X - X - 1 1 0 - - - - -
- - - - - - 1 0 0 0 1 2 1 0
X - X - 1 1 0 0 0 0 - - - 0
- - - - 1 1 1 0 0 0 - X - 0

Fig. 9G

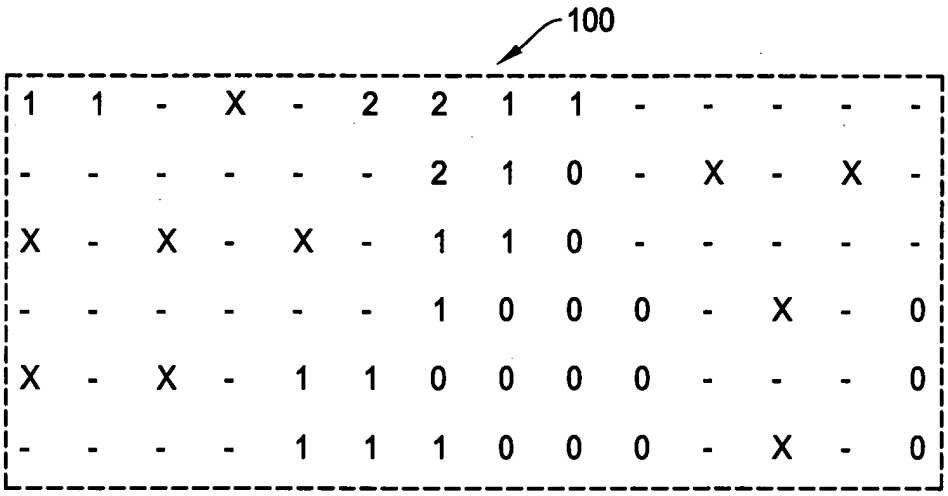
100
1 1 - X - 2 2 1 1 - - - - -
- - - - - - 2 1 0 - X - X -
X - X - X - 1 1 0 - - - - -
- - - - - - 1 0 0 0 - X - 0
X - X - 1 1 0 0 0 0 - - - 0
- - - - 1 1 1 0 0 0 - X - 0

Fig. 9H

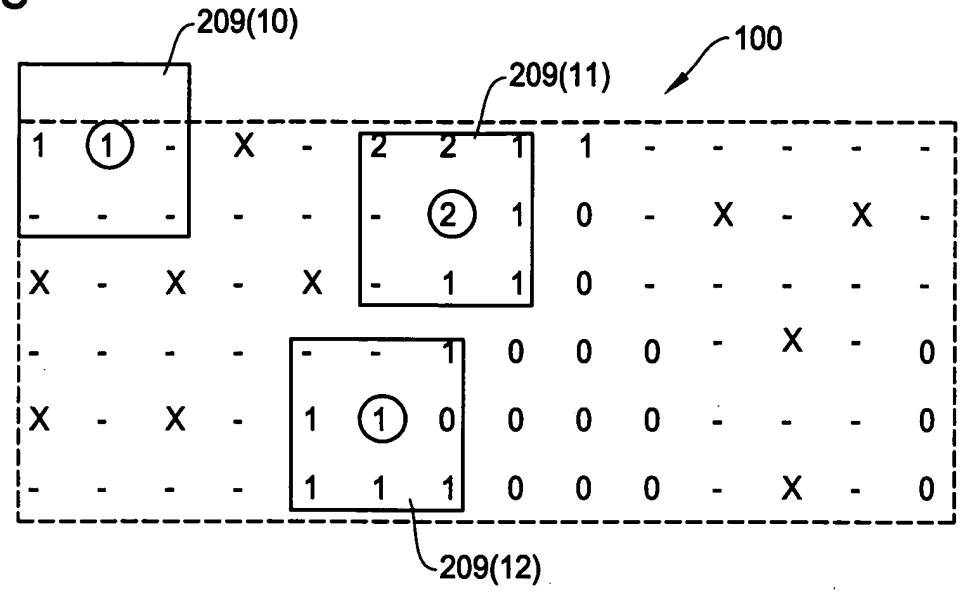

Fig. 9I

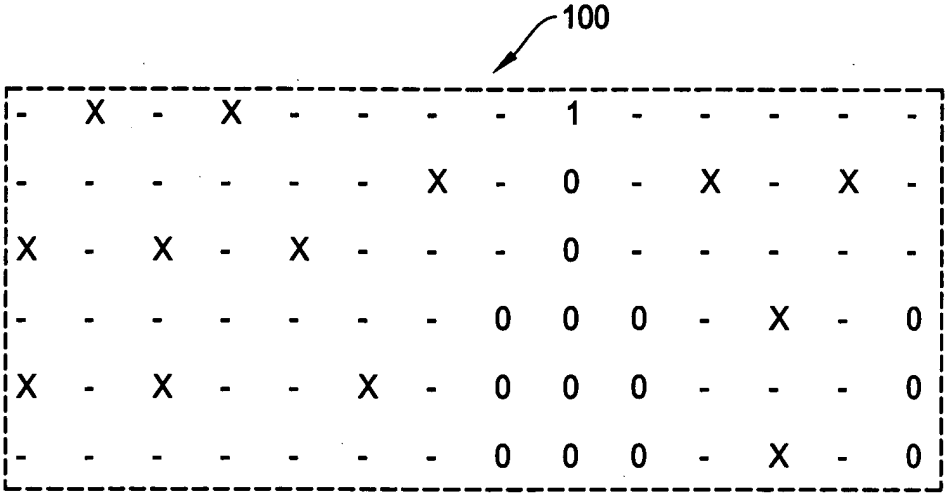

Fig. 9J

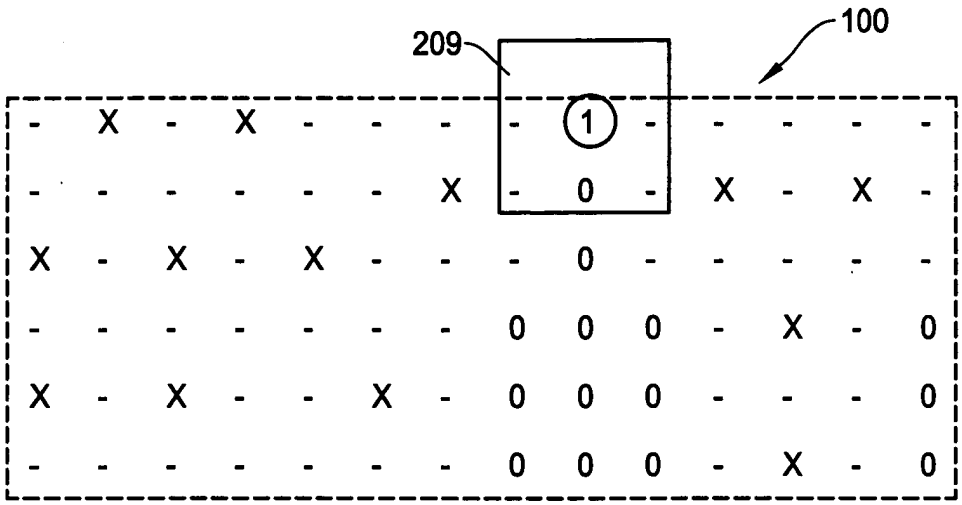
209
100
- X - X - - - - (1) - - - - -
- - - - - - X - 0 - X - X -
X - X - X - - - 0 - - - - -
- - - - - - - 0 0 0 - X - 0
X - X - - X - 0 0 0 - - - 0
- - - - - - - 0 0 0 - X - 0

Fig. 9K

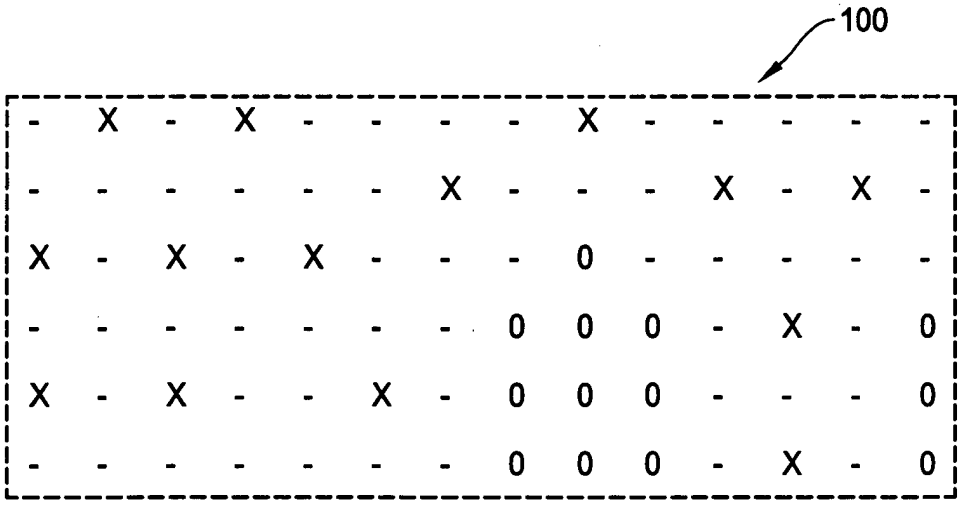
100
- X - X - - - - X - - - - -
- - - - - - X - - - X - X -
X - X - X - - - 0 - - - - -
- - - - - - - 0 0 0 - X - 0
X - X - - X - 0 0 0 - - - 0
- - - - - - - 0 0 0 - X - 0

Fig. 9L

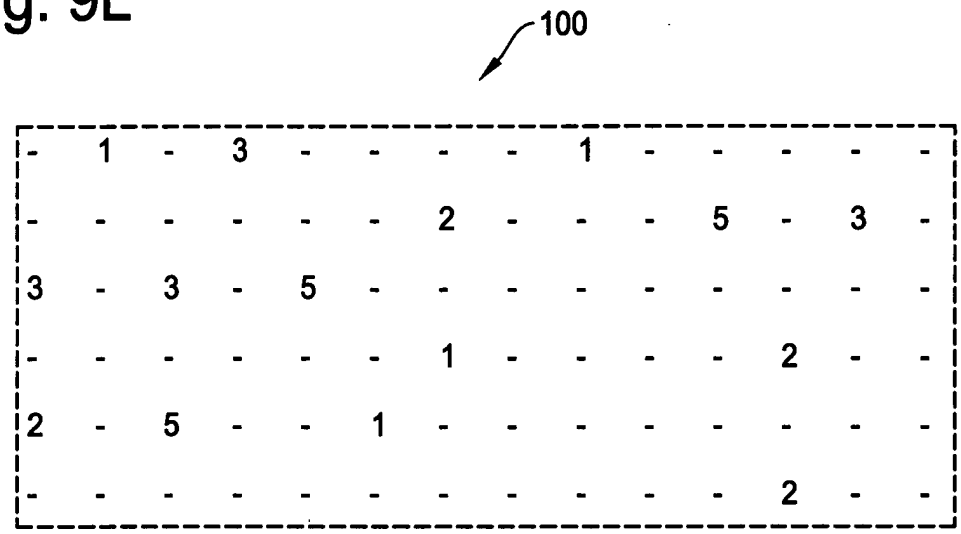
100
1 3 1
2 5 3
3 3 5
1 2
2 5 1
2

Fig. 9M

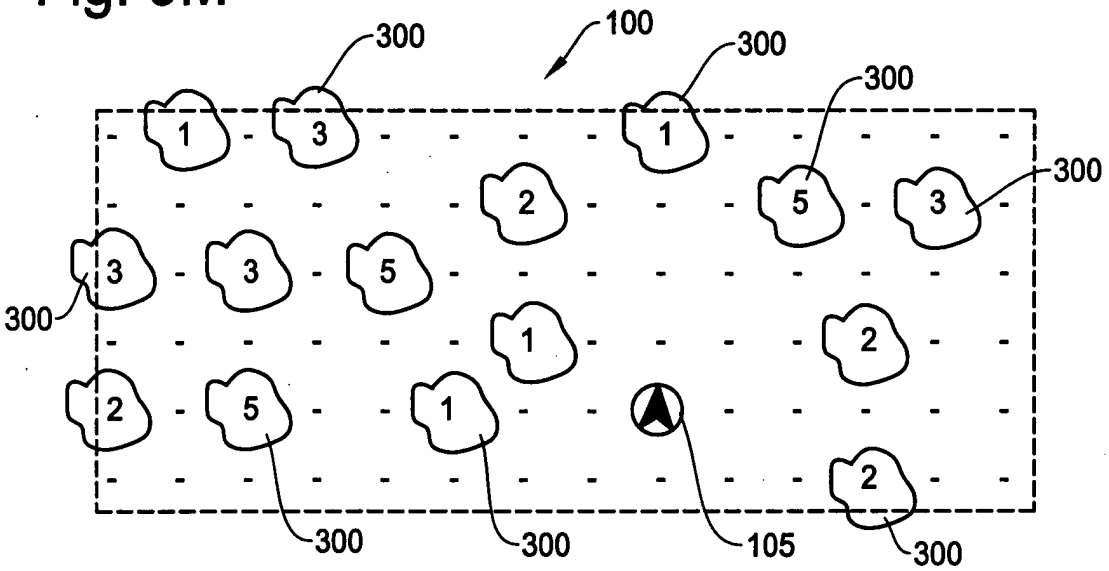
100
300
300
300
300
300
300
300
300
105
1 3 1
2 5 3
3 3 5
1 2
2 5 1
2

Fig. 10A

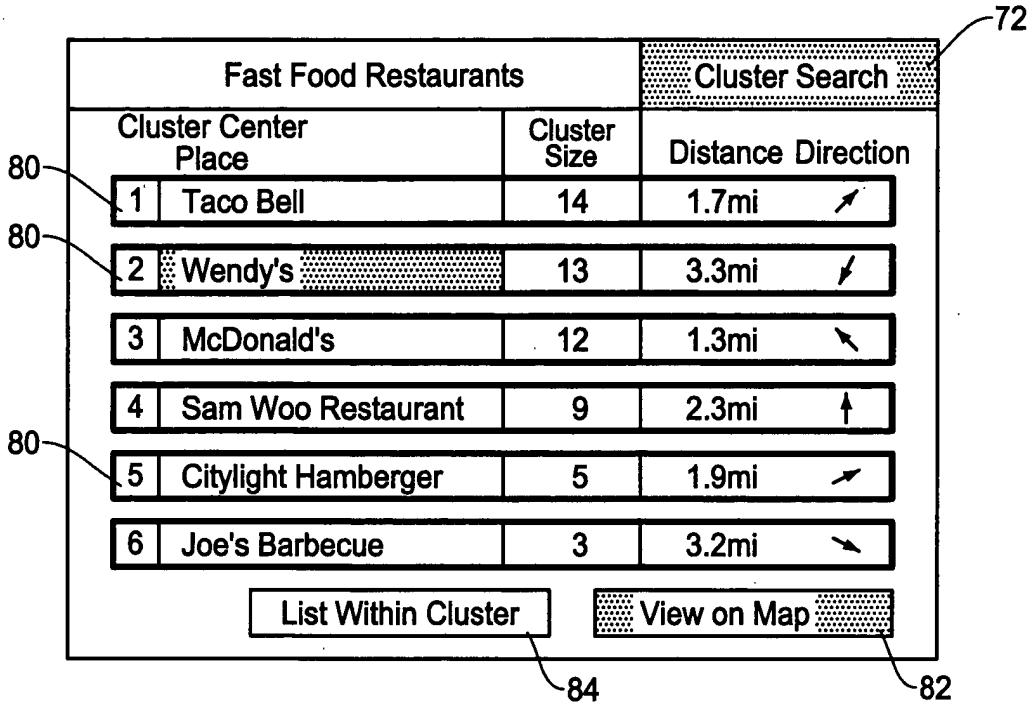

Fig. 10B

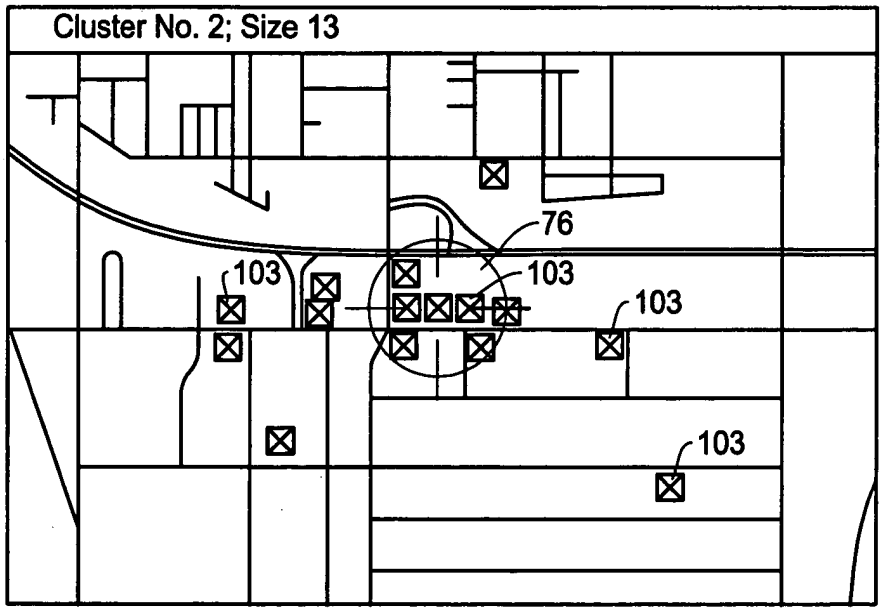

Fig. 11A

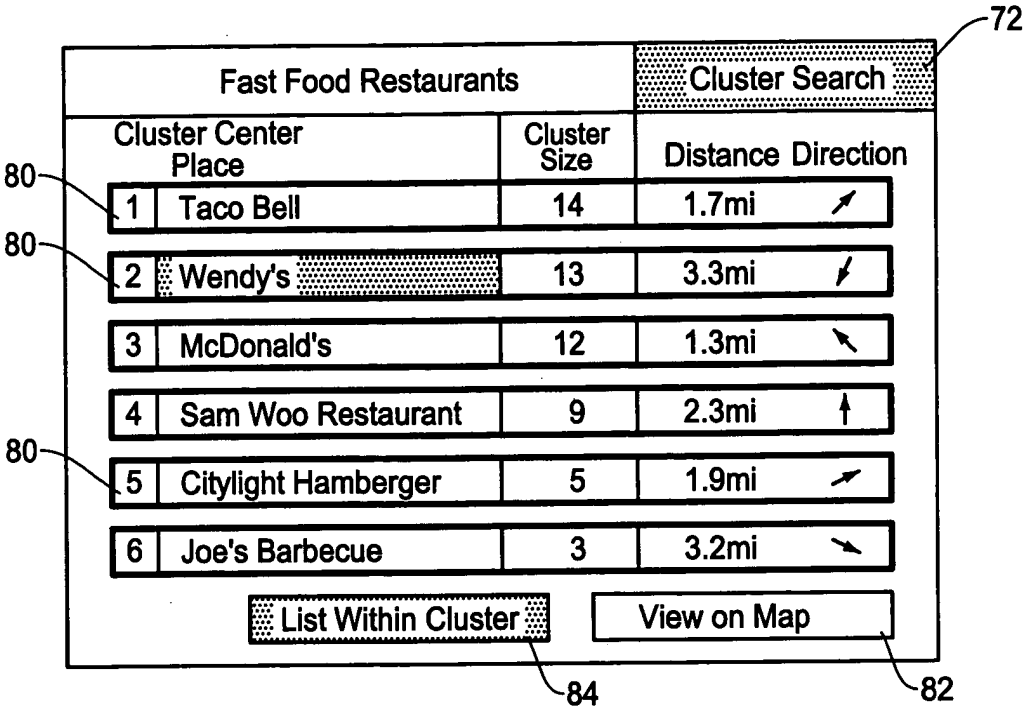

Fig. 11B

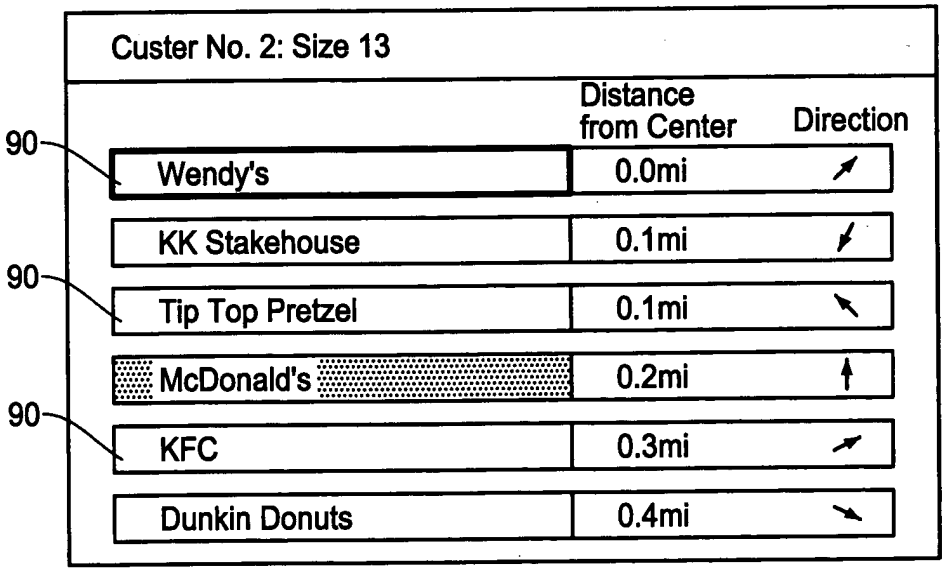

Fig. 12A

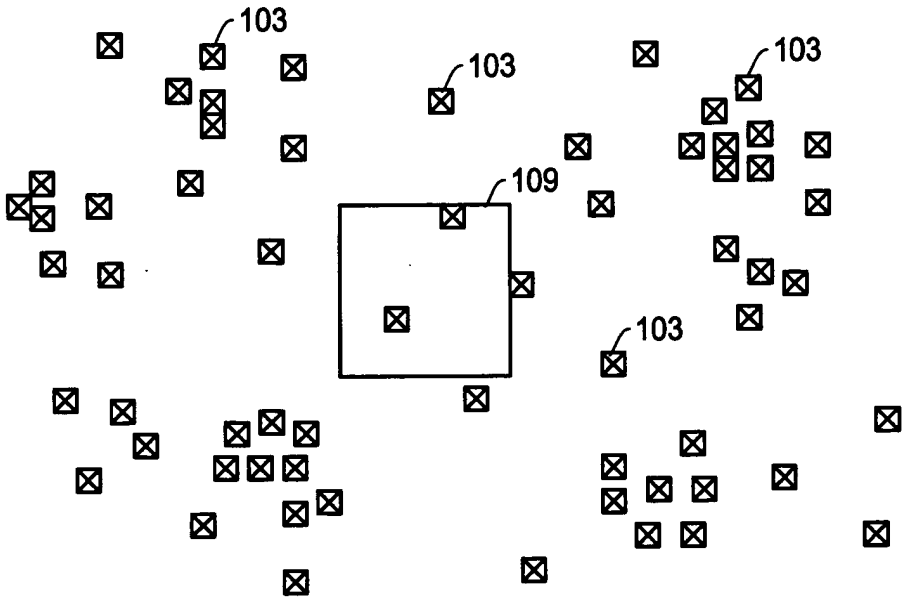
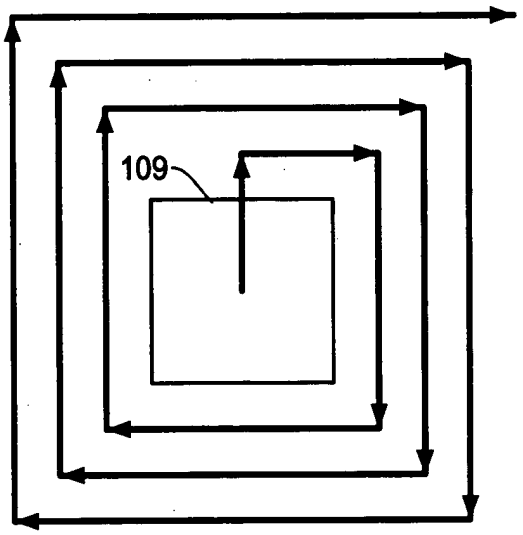
Fig. 12B